(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 393 456 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.01.2015 Bulletin 2015/04

(21) Application number: **09785803.9**

(22) Date of filing: **06.02.2009**

(51) Int Cl.:
A61F 2/46 *(2006.01)* ***B01F 13/00*** *(2006.01)*
B01F 15/02 *(2006.01)* ***B01F 11/00*** *(2006.01)*
B01F 15/00 *(2006.01)* ***B67B 7/92*** *(2006.01)*

(86) International application number:
PCT/IB2009/000220

(87) International publication number:
WO 2010/089622 (12.08.2010 Gazette 2010/32)

(54) **Mixer and method for mixing biphasic compounds**

Mischer und Verfharen zum Mischen von biphasischen Verbindungen

Mélangeur et procédé pour mélanger des composés diphasiques

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(43) Date of publication of application:
14.12.2011 Bulletin 2011/50

(60) Divisional application:
14197227.3

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to the mixing of biphasic compounds, particularly biphasic compounds used in the arthroplasty field for reconstructing or filling bone structures.

BACKGROUND ART

[0002] At present mixers are known which mix a liquid phase with a solid phase in order to make the biphasic compound to dispense. The known types of mixers can provide, for this purpose, a phial with the liquid phase connectable to a syringe containing the solid phase.

[0003] To use, the liquid contained in the phial is put into the syringe inside which a stirring device mixes the compound.

[0004] All these operations, i.e. putting the liquid phase into the syringe and mixing, must be done under sterile conditions, i.e. with no direct contact with the outside.

[0005] For this reason, in the known mixers, the phial is positioned inside a container and to get the liquid out without any direct manual contact, devices are used that can be manoeuvred from outside and designed to break the phial.

[0006] The liquid that comes out of the phial must then be put inside the syringe by means of suitable pouring means that transfer the liquid from the phial container to the mixing syringe.

[0007] A mixer of this type is described in the patent application VI2005A000152 filed by the same applicant. Such known mixers have been found to be effective from the point of view of sterility of the operations but, however, they do have some drawbacks connected to the relative difficulty in the phial breaking phase and transferring the liquid into the syringe which renders the device slightly complicated.

[0008] Another aspect of the known types of mixer concern the next phases of compound preparation during which, once the liquid and solid phases have come together in the syringe, the compound must be mixed by means of suitable stirring devices until a compound is obtained which is then dispensed, acting on the syringe piston. From this aspect, the known types of mixer have some drawbacks linked to the construction difficulty in fitting the syringe with effective stirring means to stir the compound and that has an accurate and controlled dispensing of the finished compound.

[0009] It should also be noted that, since arthroplasty operations are usually done via radioscopy with the known risks of exposure to radiations that the operators are subject to, the need is now felt to dispense the compound according to procedures that allow such risks to be minimised.

[0010] A dispenser of the type known is described as an example in the application VI2002A000140 in the name of the-same applicant.

[0011] The European application n. EP1031333 discloses a mixing device comprising a mixing space, a vacuum-generating device to generate vacuum in the mixing space and a sealed container provided in an outer container. Opening means are provided in order to break the sealed container. As an alternative to the opening device, the outer container can be altered in its position with relative to the mixing member and open in this way the sealed container.

[0012] The US application n. US 2005/281132 discloses a transfer bag containing a phial. When the phial is broken, a syringe is connected to the transfer bag in order to extract the liquid of the phial and to transfer it to a container containing a solid phase.

[0013] Document n. DE 19532015 discloses a device for mixing and dispensing multi-component products which are located in a chamber from which they can be dispensed by a piston. A mixing element is provided which is movable in the chamber and can be moved by the piston-actuating handle.

OBJECTS OF THE INVENTION

[0014] The technical aim of this invention is, therefore, to provide a mixing method that allows the mixing of the liquid and solid phases, easily and in a sterile environment.

[0015] This aim and these objects are all achieved with a method according to one or more of the claims enclosed. A first advantage of the invention is that the operations of bringing the two phases together and the mixing and dispensing of the compound are obtained with a device that is relatively simple and easy to use.

[0016] A second advantage is that all the operations are done avoiding the direct contact with the outside environment.

[0017] Yet another advantage is that the mixer used according to the invention allows the times to be reduced needed for mixing and dispensing the compound.

[0018] Another advantage is that the mixer used according to the invention allows dispensing of the exact doses of the compound in a controlled and accurate manner.

[0019] Another, but certainly not the last, advantage is that the mixer used according to the invention allows the compound to be dispensed according to operating methods that minimise all possible radiation exposure risks of the operators who are performing the arthroplasty surgery operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] These and other advantages can be better understood by all technicians in the sector thanks to the description that follows and the annexed drawings given as an example but which are not limiting, wherein:

figure 1 shows a perspective view of a mixer used according to the invention with one mixing unit and one dispensing unit operatively connected;
figure 2 shows a perspective view of a detail of one mixing unit connected to a cartridge used according to the invention containing the liquid phase;
figure 3 shows a detail of the cartridge of figure 2;
figure 4 shows a detail of the mixing unit of figure 2;
figure 5 shows a detail of the connection between the mixing unit and the dispensing unit of figure 1;
figure 6 shows schematically a lateral snap-in connection between the mixing unit and the dispensing unit;
figure 7 illustrates a perspective view of the mixing unit in another form of embodiment of the mixer used according to the invention;
figure 8 represents a perspective view of the stirrer of the mixing unit of figure 7;
figure 9 shows a perspective view of another form of embodiment of the stirrer of the mixing unit of figure 7;
figure 10 illustrates a perspective view of a syringe being used associable with the mixing unit of figure 7;
figure 11 represents a perspective view of the mixing unit of figure 7 coupled to the cartridge containing the liquid phase of the compound;
figure 12 shows a perspective view of the mixing unit of figure 7 coupled to the syringe being used;
figure 13 illustrates a perspective view of the mixing unit of figure 7 in the phase of compound dispensing inside the syringe being used;
figure 14 represents a perspective view of the dispensing unit of the mixer used according to the invention, in another form of embodiment;
figure 15 shows a perspective view of a detail of the dispensing unit of figure 14, coupled to the mixing unit;
figure 16 illustrates a perspective view of the dispensing unit of the mixer used according to the invention, in another form of embodiment;
figure 17 represents a perspective view of the electromechanical actuator of the dispensing unit of figure 16.

EMBODIMENTS OF THE INVENTION

[0021] With reference to the drawings, 1 designates a mixer for biphasic compounds used according to the invention in one of its embodiments.

[0022] The mixer 1 of biphasic compounds used according to the invention comprises one mixing unit, indicated with 3, one dispensing unit, indicated with 2 and one cartridge, indicated with 4, containing the liquid phase and which can be connected together in order to mix the liquid phase with the solid phase and to dispense a quantity of the mixed biphasic compound.

[0023] In more detail, and in particular with reference to figures 2 and 3, the mixer 1 comprising a chamber 21 for containing a solid phase 22, and a cartridge 4 containing a phial 18 of a liquid phase.

[0024] The chamber 21 and the cartridge 4 can communicate through the relative channels 19, 20 and can be joined in a removable manner, e.g. using screw means composed of an external thread 17 made by the channel 19 of the cartridge 4 and which engages with an internal thread 16 of a locking ring nut 15 turning around the channel 20 of the mixing chamber 21.

[0025] According to the invention, the cartridge 4 advantageously comprises an external casing 25 made in a deformable material so that the phial 18, being the breakable type, once connected to the chamber 21, can be broken from the outside, e.g. on a breaking point 28, according to the method of the type known.

[0026] When the phial has been broken the deformable casing can then be squeezed and the liquid transferred inside the chamber 21 through the channels 19 and 20, preferably interposing a filter - not shown in the figures - to prevent any fragments of glass from accidentally getting inside the chamber 21. Advantageously, with this technical solution, the liquid phase is joined with the solid phase inside the chamber 21 simply, in a completely sterile fashion and with no contact with the outside and without the minimum mechanical or structural complication.

[0027] The casing 25 is made in a flexible material - that is, that acts substantially in an elastic way - and has an internal volume 29 greater than the volume taken up by said phial 18.

[0028] With this solution it is possible to exploit an advantageous pumping effect to force the liquid into the chamber 21 without having to provide other or more complicated auxiliary devices.

[0029] With particular reference to figures 4 and 5, the mixing unit 3 and the dispensing unit 2 used according to the invention are described in more detail. In the form of embodiment described here, the unit 3 is in the shape of a syringe body comprising a container 24 defining inside it the mixing chamber 21, and which has on one end the channel 20 already described that has a ring nut 15 for fixing to the cartridge 4.

[0030] On the other end, the container 24 has a piston 23 which seals the chamber 21 and fixing means 10 for fixing to the dispensing unit 2 which, in the form of embodiment illustrated, are composed of an external screw 10 which engages frontally with an internal screw 9 made in one block 26 integral with the handgrip 8 of the unit 2 which is described in more detail further on.

[0031] In different forms of embodiment, the mixing unit 3 and the dispensing unit 2 can in any case be connected by removable means of different kinds either quick coupling or interlocking like, e.g., a bayonet coupling or a similar type. According to the invention, stirring means are arranged inside the chamber 21 which, in the form of embodiment described, comprise a stirrer 12 in the shape of a propeller driven by a longitudinal rod 11 that extends at least along the whole chamber 21, going through a hole 30 of the piston 23 and which is hermet-

ically sealed.

[0032] Preferably, the rod 11 also comprises a gripping knob 13 which extends beyond the chamber 21 and which facilitates the propeller 12 manoeuvring.

[0033] Note that use of the knob is advantageous but is not essential, for example when one wishes to use a connection between the mixing unit 3 and the dispensing unit 2 of the lateral snap-in type, e.g. composed of a prismatic coupling (e.g. dovetail) achieved by the transversal movement with respect to a longitudinal axis of the mixer (e.g. the axis of the screw 6 and/or of the chamber 21).

[0034] One possible example of a lateral snap-in connection 31 is schematised in figure 6.

[0035] When using, the stirrer 12 can be turned and moved longitudinally by means of the rod 11 which slides through the piston 23 until completing the mixing of the solid phase which is inside the chamber 21 with the liquid phase already in the cartridge 4 and until a biphasic compound is obtained, ready for final dispensing.

[0036] Advantageously, the dispensing phase is carried out by means of a dispensing unit 2 that comprises an extrusion screw with an external thread 6 that engages with a corresponding internal thread 7 created inside the handgrip 8 so as to advance, subsequent to the rotation of the screw, e.g. by using the knob 5. Subsequent to rotation, the screw 6 moves forward and presses on the piston 23 forcing it to slide along the mixing chamber 21.

[0037] According to the invention, the screw 6 has a longitudinal inner cavity 14 that houses the rod 11 in a sliding manner, so that as the screw and piston advance the rod 11 returns and is concealed inside the cavity 14 without interfering with the dispensing action made by the unit 2.

[0038] With this solution an effective mixing of the compound has been achieved and, without any delay, to be able to dispense, in a controlled and accurate way, the quantity wanted of the compound, all under conditions of maximum sterility and absence of manipulations or possible contact of the compound with the outside.

[0039] In another form of embodiment of the mixer for biphasic compounds used according to the invention, represented in figures 7 to 13, the mixing unit 3 comprises a container 24, substantially in the shape of a syringe, defining the mixing chamber 21 and communicating, on one of its ends, with the channel 20. The screw means, described previously, are also on this same end for the removable connection to the cartridge 4.

[0040] Reference is now made to figure 7 in particular. Where the other end is, the container 24 is associated with a piston 23 which closes (thus sealing) the mixing chamber 21 to which a manually operated stem 32 is integrally connected, used to dispense the compound, as is more clearly explained below. In particular, the stem 32 has, on its free end, an eyelet 33 for manual thrusting, or alternatively for being connected to thrusting means which are not represented in the figures enclosed: the thrust exerted on the eyelet 33 does, of course, allow the compound to be dispensed through the channel 20. The stem 32 is hollow inside and its axial cavity communicates with the hole 30 of the piston 23. In the axial cavity of the stem 32 the rod 11 is engaged in a sliding manner and has the stirrer 12 for mixing the compound on its end. The stem 32 also has a pair of opposing longitudinal slots 34 that communicate with its axial cavity and along which a sort of handgrip 35 is guided in a sliding manner: the latter comes out from said slots 34 sideways and allows the rod 11 to move inside the chamber 21 to mix the compound.

[0041] The stirrer 12, represented in particular in figure 8, comprises a propeller, with a substantially cross shape, where the four blades 36 have an even cross section and smaller compared to that provided in the previous form of embodiment: this solution is even more effective in association with a mixing unit 3 like the one described previously and that can even be quite big. In such a situation therefore, the small dimensions of the blades 36 of the stirrer 12 limit resistance to stirring which the operator is aware of and feels especially when the compound being prepared has a relatively high viscosity.

[0042] In one of its alternative forms of embodiment, represented in figure 9, the stirrer 12 is composed of a propeller comprising six blades for applications in which the compound to be prepared has a relative low viscosity.

[0043] In addition, the mixer, according to this current form of embodiment, comprises at least one syringe, indicated with 37 and represented in figure 10, usable for dosing the quantity of compound to use in each arthroplasty operation. The syringe 37 is, in fact, smaller compared to the mixing unit 3 and in particular it substantially corresponds to the dose required for each operation.

[0044] The syringe 37 has an internal dispensing volume 38 delimited by a dispensing piston 39, sliding freely and sealed. On one of its ends the syringe 37 has screw elements 40 for the removable and sealed connection to the ring nut 15 of the mixing unit 3, e.g. composed of an external thread on this same end; in addition, the screw elements 40 can comprise, in an equal measure and whenever demanded by application requirements, a sealed fixing ring nut.

[0045] The way in which the mixer is used according to this form of embodiment is the following.

[0046] Once the mixing unit 3 is ready with the solid phase of the compound and the cartridge 4 with the liquid phase of the compound, they are connected together with the screw means 15 as illustrated in figure 11. After this the phial 18 must be broken and then the casing 25 squeezed to push the liquid phase inside the chamber 21. When all the liquid phase has been pushed inside the chamber 21, operate the handgrip 35 of the stirrer 12 manually so the stirrer 12 moves axially and alternatively inside the chamber 21, mixing the two phases and obtaining the compound required.

[0047] Now, to achieve the exact dosage of the quantity of compound to use in an arthroplasty operation, separate the casing 25, emptied of its contents, from the mixing unit 3 and connect the syringe 37 described pre-

viously to the mixing unit 3, using the screw elements 40 as shown in figure 12. Lastly, operate on the eyelet 33 of the mixing unit 3, exerting sufficient manual pressure so as to transfer a certain quantity of the compound from the chamber 21 to the dispensing volume 38, as can be seen in figure 13: the quantity of compound transferred will, of course, be defined by the dispensing volume 38 itself and so will be used effectively in the surgical operation without having to proceed with other dosing operations.

[0048] In another form of embodiment of the mixer used according to the invention, represented in figures 14 and 15, the mixing unit 3 comprises a container 24, which is substantially in the shape of a syringe, defining the mixing chamber 21 and in which the compound can be prepared using the cartridge 4 as explained in the previous forms of embodiment.

[0049] With particular reference to figure 14, the dispensing unit 2 of the compound comprises, in this current form of embodiment, a drive element 41 for the piston 23 of the mixing unit 3 which can be remotely started, as will be made clearer further on. Such remote starting considerably reduces exposure of the operators to any radiation there may be in the area where the surgical operation is being performed.

[0050] The drive element 41, represented in detail in figure 15 associated with the mixing unit 3, comprises a syringe element inside which a drive piston 42 slides in a hermetically sealed way, connected to a respective axial drive stem 43: the drive piston 42 defines, together with the sides of the syringe element, a drive chamber 44. On one of its ends, the drive element 41 comprises a threaded opening 45 that connects to the mixing unit 3 while on the other end it comprises a tang 46 with an axial hole 47 allowing the drive chamber 44 to communicate with the outside.

[0051] The dispensing unit 2 also comprises pumping means, indicated with 48, of a thrusting fluid for the drive piston 42: these pumping means 48 are suitable for making the drive stem 43 move in such a way that it presses the piston 23 of the mixing unit 3 and dispenses the compound during the surgical operation. The use of the above mentioned pumping means 48 allows the command and the control of the compound dispensing to be located remotely so that the operators are in an area protected against radiation.

[0052] The pumping means 48 comprise a hand pump 49 composed of a cylindrical chamber 50 inside which a manually operated plunger 51 slides. The cylindrical chamber 50 has a first fitting 52 which communicates with a tank 53 of fluid and a second fitting 54 which is coaxial to the cylindrical chamber 50.

[0053] The tank 53 is composed of a disposable bag made in a known type of plastic material, containing a sterile physiological solution; a first pipe 55 connects the tank 53 to the first fitting 52 in a unidirectional way by means of, e.g., a check valve of the known type and not shown in the figures.

[0054] A second pipe 56, of an appropriate length, connects in a unidirectional way by means of, e.g., a check valve of the known type and not shown in the figures -

[0055] the second fitting 54 to a third fitting 57 mounted by the tang 46 of the drive element 41.

[0056] The way in which the mixer is used according to this form of embodiment is the following. Once the compound has been prepared with the mixing unit 3, according to the procedures described above, the mixing unit 3 is connected, in a sealed way, to the opening 45: in this way the end of the drive stem 43 is moved into contact with the piston 23 of the mixing unit 3.

[0057] Then, by means of the hand pump 49, the plunger 51 is pulled towards the outside so the physiological solution can go from the tank 53 into the cylindrical chamber 50 through the first pipe 55. Subsequently, by exerting pressure on the plunger 51, the physiological solution flows through the second pipe 56 so that the solution, having reached an appropriate pressure, makes the drive piston 42 move with the relative drive stem 43: in this way we have a thrusting action on the piston 23 of the mixing unit 3 which dispenses the compound inside, e.g., a syringe like the one described previously, or other means and/or devices provided for carrying out the operation and which are not the object of this invention.

[0058] Yet another form of embodiment of the mixer used according to the invention is represented in figures 16, 17.

[0059] In this form of embodiment, the pumping means 48 of the physiological solution, introduced in the previous form of embodiment, comprise a remotely controllable electromechanical pump 58 which requires no manual work by the operators. More in detail, this electromechanical pump 58 comprises a cylindrical chamber 50 similar to the one described in the previous form of embodiment, i.e. having a first communicating fitting with a first pipe 55 and a second communicating fitting 54 with a second pipe 56. A hermetically sealed plunger 51 slides inside the cylindrical chamber 50, the plunger 51 being associated with an electromechanical actuator 59, represented in detail in figure 17 and which, in turn, is fixed to the cylindrical chamber 50. The electromechanical actuator 59 comprises an electric motor 60 coupled to a screw mechanism of the type known, that acts on the plunger 51 which slides inside a cylindrical guide 61 integral with the motor 60.

[0060] The motor 60 has a terminal 62 for the electrical connection, via cables 63, to a receiving station 64 of radio control signals emitted by a transmitting station, not represented in the figures but of the type known, and which is remotely operated by the operators. As mentioned previously, the first fitting 52 connects the cylindrical chamber 50 to a tank 53 of physiological solution, while the second fitting 54 hydraulically connects the cylindrical chamber 50 to the third fitting 57 on the drive element 40, already described.

[0061] This technical solution allows control of the pumping means 48 to be transferred to any position pro-

tected against the radiations there could be in the room and, in addition, does not require the manual operation of the above mentioned means 48.

[0062] Another form of embodiment envisages one dispensing unit 2 of the compound comprising a drive element 41 that can be started remotely, suitable for exerting a thrust of pressure on the piston 23 of the mixing unit 3 so the compound can be dispensed.

[0063] More in detail, the dispensing unit 2 comprises an electromechanical actuator of the type similar to the one illustrated in figure 17, interlocked to a receiving station like the one shown in figure 16. The plunger 51 of the electromechanical actuator 59 can be connected mechanically to the drive piston 42 so that, subsequent to a suitable command signal received from a transmitting station, the drive stem 32 of the drive element 41 can press on the piston 23 and thus dispense the compound.

[0064] This invention has been described according to preferred forms of embodiment but equivalent variants can be conceived without falling outside the protection scope of these claims.

Claims

1. Method for mixing biphasic compounds, comprising a mixer comprising a chamber (21) for containing a solid phase (22) and a cartridge (4) containing a phial (18) of a liquid phase (27), wherein said phial (18) is of the breakable type, said chamber (21) and said cartridge (4) being able to communicate through respective channels (19, 20), wherein said cartridge (4) comprises an external casing (25) made in a deformable and elastic material and has an internal volume (29) greater than the volume taken up by said phial (18), comprising the following steps:

   break said phial (18) from the outside on a breaking point (28),
   squeeze the external casing (25) to pump and transfer said liquid phase (27) inside said chamber (21) through said channels (19, 20).

2. Method as claimed in claim 1, **characterized in that** said mixer comprises at least a syringe (37) associable in a removable manner with a mixing unit (3), suitable for dosing the quantity of compound to use, said mixing unit (3) comprising a container (24), which is substantially in the shape of a syringe and defines said chamber (21).

3. Method according to claim 2, **characterized in that** said syringe (37) comprises at least a dispensing piston (39), axially sliding, which defines at least a dispensing volume (38) for dosing the quantity of compound to use, and screw elements (40) for the removable and sealed connection to said mixing unit (3).

4. Method according to claim 1, comprising one mixing unit (3) and one dispensing unit (2) operatively connected for mixing said liquid phase (27) and said solid phase (22) through stirring means operating inside said mixing chamber (21), and for dispensing a quantity of mixed biphasic compound through a channel (20) of said chamber (21), said mixing unit (3) comprising a container (24), which is substantially in the shape of a syringe and defines said chamber (21), wherein said stirring means comprise a stirrer (12) driven by a longitudinal rod (11) and wherein said mixer comprises a piston (23) sliding longitudinally on command along said chamber (21) and with a hole (30) to house said rod (11) in a sliding manner.

5. Method according to claim 4, **characterized in that** said dispensing unit (2) comprises an extrusion screw (6) having a longitudinal cavity (14) suitable for housing said rod (11) in a sliding manner and operatively associable with said mixing unit (3) to control the longitudinal movement of the piston (23) along the chamber (21).

6. Method according to claim 4 or 5, **characterized in that** said mixing unit (3) and said dispensing unit (2) are frontally connected through screw means (9, 10).

7. Method according to claim 4 or 5, **characterized in that** said mixing unit (3) and said dispensing unit (2) are connected through front interlocking means, e.g. bayonet coupling means.

8. Method according to claim 4 or 5, **characterized in that** said mixing unit (3) and said dispensing unit (2) are connected through lateral snap-in means.

9. Method according to one of the claims 4-8, **characterized in that** said stirrer (12) is in the shape of a propeller.

10. Method according to one of the claims 4-9, **characterized in that** said rod (11) comprises a gripping knob (13).

11. Method according to one of the claims 4-10, **characterized in that** said dispensing unit (2) comprises a knob (5) controlling said extrusion screw (6).

12. Method according to one of the claims 4-11, **characterized in that** said dispensing unit (2) comprises a handgrip (8).

13. Method according to claim 1, **characterized in that** said chamber (21) and said cartridge (4) can be connected through screw means (16, 17).

Patentansprüche

1. Verfahren zum Mischen von zweiphasigen Zusammensetzungen, das ein Mischgerät umfasst, das eine Kammer (21) zum Enthalten einer Festphase (22) und eine Kartusche (4) umfasst, die eine Ampulle (18) einer Flüssigphase (27) enthält, wobei diese Ampulle (18) zerbrechlich ist, wobei diese Kammer (21) und diese Kartusche (4) durch entsprechende Kanäle (19, 20) miteinander in Verbindung stehen können, wobei diese Kartusche (4) ein äußeres Gehäuse (25) umfasst, das aus einem verformbaren und elastischen Material besteht, und ein Innenvolumen (29) aufweist, das größer als das von der Ampulle (18) eingenommene Volumen ist, wobei es die folgenden Schritte umfasst:

   Zerbrechen der Ampulle (18) von außen an einer Bruchstelle (28),
   Zusammendrücken des äußeren Gehäuses (25), um die Flüssigphase (27) durch die Kanäle (19, 20) in die Kammer (21) zu pumpen und zu übertragen.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** das Mischgerät mindestens eine Spritze (37) umfasst, die lösbar mit einer Mischeinheit (3) verbunden werden kann und zum Dosieren der zu verwendenden Zusammensetzungsmenge geeignet ist, wobei die Mischeinheit (3) einen Behälter (24) umfasst, der eine im Wesentlichen Spritzenform aufweist und die Kammer (21) definiert.

3. Verfahren nach Anspruch 2, **dadurch gekennzeichnet, dass** die Spritze (37) mindestens einen axial gleitenden Ausgabekolben (39), der mindestens ein Ausgabevolumen (38) zum Dosieren der zu verwendenden Zusammensetzungsmenge definiert, und Schraubelemente (40) zum lösbaren und dichten Verbinden mit der Mischeinheit (3) umfasst.

4. Verfahren nach Anspruch 1, das eine Mischeinheit (3) und eine Ausgabeeinheit (2) umfasst, die zum Mischen der Flüssigphase (27) und der Festphase (22) mit Hilfe von in der Mischkammer (21) arbeitenden Rührmitteln und zum Ausgeben einer Menge gemischter zweiphasigen Zusammensetzung durch einen Kanal (20) dieser Kammer (21) betriebsfähig miteinander verbunden sind, wobei die Mischeinheit (3) einen Behälter (24) umfasst, der eine im Wesentlichen Spritzenform aufweist und die Kammer (21) definiert, wobei diese Rührmittel einen Rührer (12) umfassen, der von einem Längsstab (11) angetrieben wird, und wobei das Mischgerät einen Kolben (23) umfasst, der auf Veranlassung längs der Kammer (21) in Längsrichtung gleitet und ein Loch (30) zum gleitenden Aufnehmen des Stabs (11) aufweist.

5. Verfahren nach Anspruch 4, **dadurch gekennzeichnet, dass** die Ausgabeeinheit (2) eine Extrusionsschnecke (6) mit einem länglichen Hohlraum (14) umfasst, der zum gleitenden Aufnehmen des Stabs (11) geeignet ist und betriebsfähig mit der Mischeinheit (3) verbunden werden kann, um die Bewegung in Längsrichtung des Kolbens (23) längs der Kammer (21) zu steuern.

6. Verfahren nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Mischeinheit (3) und die Ausgabeeinheit (2) durch Schraubmittel (9, 10) stirnseitig verbunden sind.

7. Verfahren nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Mischeinheit (3) und die Ausgabeeinheit (2) durch vordere Formschlussmittel, z.B. Bajonettverschlussmittel, verbunden sind.

8. Verfahren nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Mischeinheit (3) und die Ausgabeeinheit (2) durch seitliche Rastmittel verbunden sind.

9. Verfahren nach einem der Ansprüche 4 bis 8, **dadurch gekennzeichnet, dass** der Rührer (12) die Form eines Propellers hat.

10. Verfahren nach einem der Ansprüche 4 bis 9, **dadurch gekennzeichnet, dass** der Stab (11) einen Greifknopf (13) umfasst.

11. Verfahren nach einem der Ansprüche 4 bis 10, **dadurch gekennzeichnet, dass** die Ausgabeeinheit (2) einen Knopf (5) umfasst, der die Extrusionsschnecke (6) steuert.

12. Verfahren nach einem der Ansprüche 4 bis 11, **dadurch gekennzeichnet, dass** die Ausgabeeinheit (2) einen Handgriff (8) umfasst.

13. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Kammer (21) und die Kartusche (4) durch Schraubmittel (16, 17) verbunden werden können.

Revendications

1. Procédé pour mélanger des composés diphasiques, comprenant un mélangeur comprenant une chambre (21) pour contenir une phase solide (22) et une cartouche (4) contenant une ampoule (18) d'une phase liquide (27), dans lequel ladite ampoule (18) est du type cassable, ladite chambre (21) et ladite cartouche (4) étant aptes à communiquer à travers des canaux respectifs (19, 20), dans lequel ladite cartouche (4) comprend une enveloppe externe (25)

réalisée en un matériau déformable et élastique et a un volume interne (29) supérieur au volume occupé par ladite ampoule (18), comprenant les étapes suivantes :

la rupture de ladite ampoule (18) de l'extérieur sur un point de rupture (28),
la pression sur l'enveloppe externe (25) pour pomper et transférer ladite phase liquide (27) à l'intérieur de ladite chambre (21) à travers lesdits canaux (19, 20).

2. Procédé selon la revendication 1, **caractérisé en ce que** ledit mélangeur comprend au moins une seringue (37) associable d'une manière amovible avec une unité de mélange (3), adaptée pour doser la quantité de composé à utiliser, ladite unité de mélange (3) comprenant un récipient (24), lequel est sensiblement sous la forme d'une seringue and définit ladite chambre (21).

3. Procédé selon la revendication 2, **caractérisé en ce que** ladite seringue (37) comprend au moins un piston de distribution (39), coulissant axialement, qui définit au moins un volume de distribution (38) pour doser la quantité de composé à utiliser, et des éléments à vis (40) pour la connexion amovible et hermétique avec ladite unité de mélange (3).

4. Procédé selon la revendication 1, comprenant une unité de mélange (3) et une unité de distribution (2) connectées fonctionnellement pour mélanger ladite phase liquide (27) et ladite phase solide (22) par le biais de moyens agitateurs agissant à l'intérieur de ladite chambre de mélange (21), et pour distribuer une quantité de composé diphasique mélangé à travers un canal (20) de ladite chambre (21), ladite unité de mélange (3) comprenant un récipient (24), lequel est sensiblement sous la forme d'une seringue and définit ladite chambre (21), dans lequel lesdits moyens agitateurs comprennent un agitateur (12) entraîné par une tige longitudinale (11) et dans lequel ledit mélangeur comprend un piston (23) coulissant longitudinalement sur commande le long de ladite chambre (21) et avec un trou (30) pour loger ladite tige (11) d'une manière coulissante.

5. Procédé selon la revendication 4, **caractérisé en ce que** ladite unité de distribution (2) comprend une vis d'extrusion (6) ayant une cavité longitudinale (14) adaptée pour loger ladite tige (11) d'une manière coulissante et associable fonctionnellement avec ladite unité de mélange (3) pour commander le mouvement longitudinal du piston (23) le long de la chambre (21).

6. Procédé selon la revendication 4 ou 5, **caractérisé en ce que** ladite unité de mélange (3) et ladite unité de distribution (2) sont connectées frontalement par l'intermédiaire de moyens à vis (9, 10).

7. Procédé selon la revendication 4 ou 5, **caractérisé en ce que** ladite unité de mélange (3) et ladite unité de distribution (2) sont connectées par l'intermédiaire de moyens de verrouillage réciproque frontaux, par exemple des moyens d'accouplement à baïonnette.

8. Procédé selon la revendication 4 ou 5, **caractérisé en ce que** ladite unité de mélange (3) et ladite unité de distribution (2) sont connectées par l'intermédiaire de moyens d'encliquetage latéraux.

9. Procédé selon une des revendications 4 à 8, **caractérisé en ce que** ledit agitateur (12) est sous la forme d'une hélice.

10. Procédé selon une des revendications 4 à 9, **caractérisé en ce que** ladite tige (11) comprend un bouton de préhension (13).

11. Procédé selon une des revendications 4 à 10, **caractérisé en ce que** ladite unité de distribution (2) comprend un bouton (5) commandant ladite vis d'extrusion (6).

12. Procédé selon une des revendications 4 à 11, **caractérisé en ce que** ladite unité de distribution (2) comprend une poignée (8).

13. Procédé selon la revendication 1, **caractérisé en ce que** ladite chambre (21) et ladite cartouche (4) peuvent être connectées par l'intermédiaire de moyens à vis (16, 17).

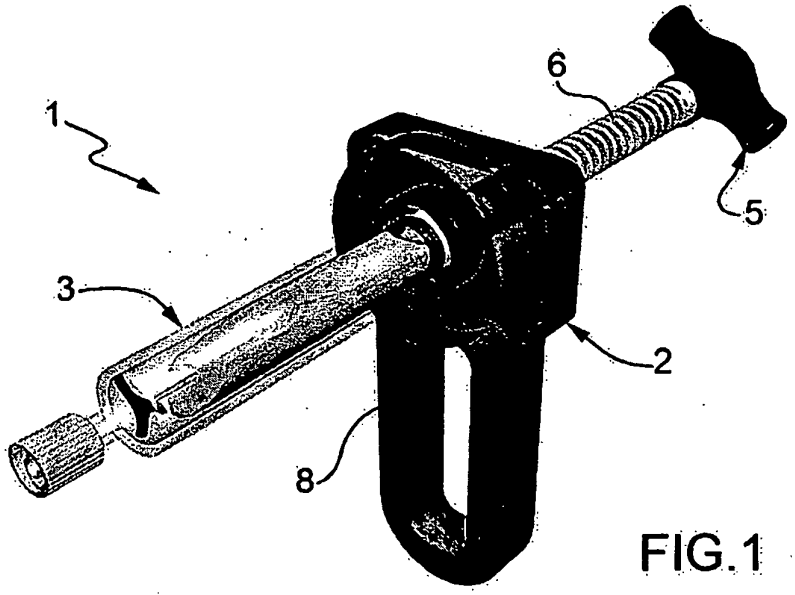

FIG.1

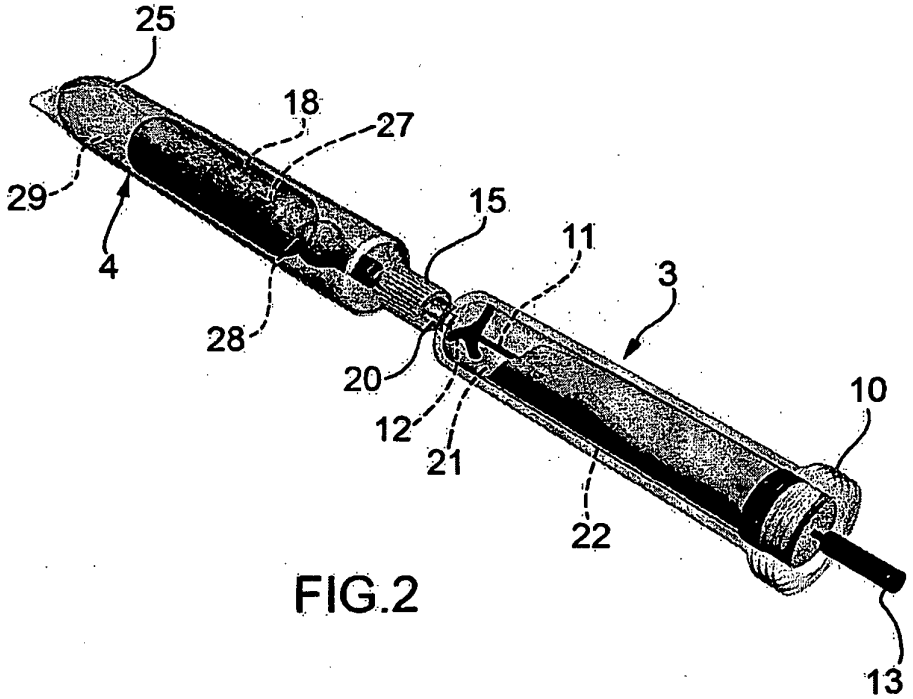

FIG.2

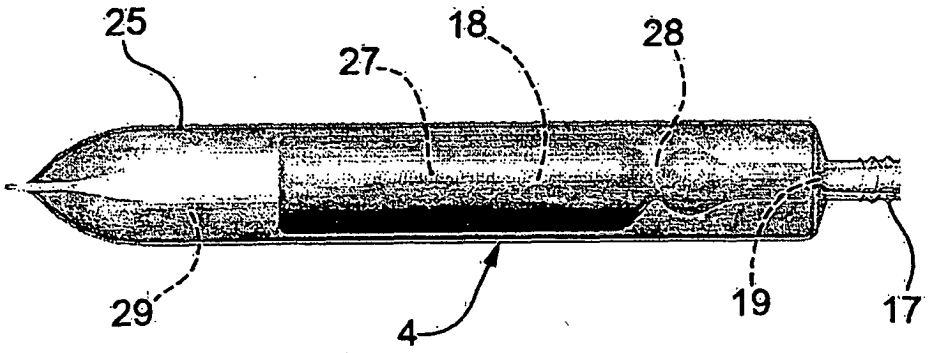

FIG.3

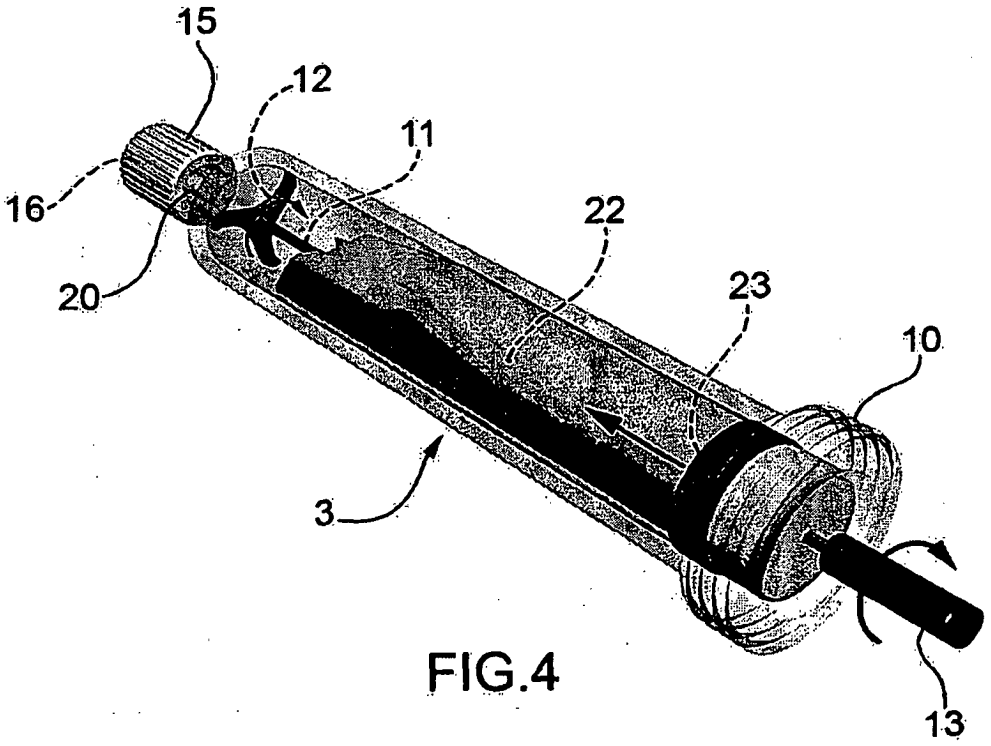

FIG.4

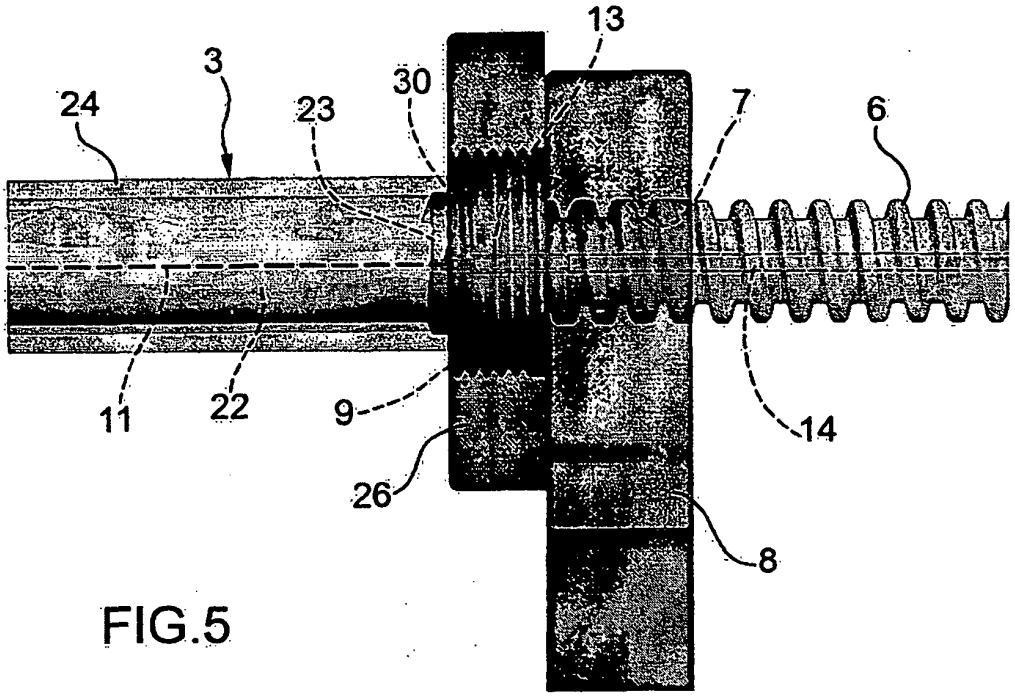

FIG.5

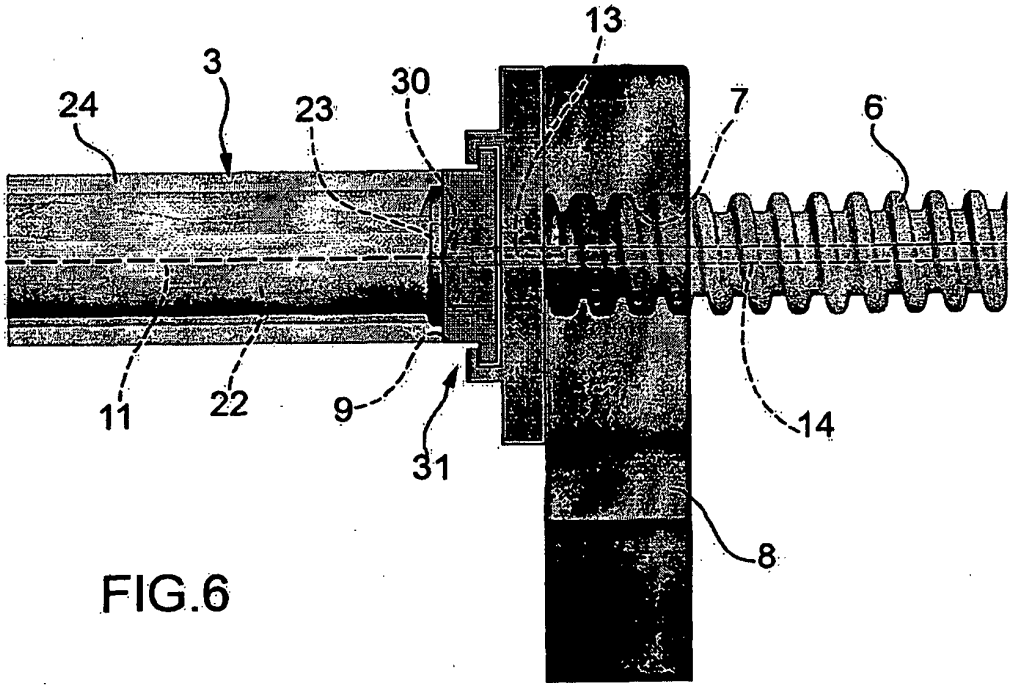

FIG.6

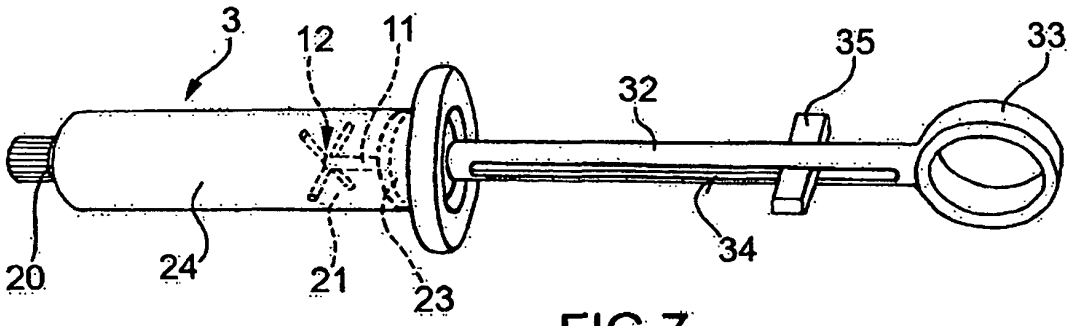

FIG.7

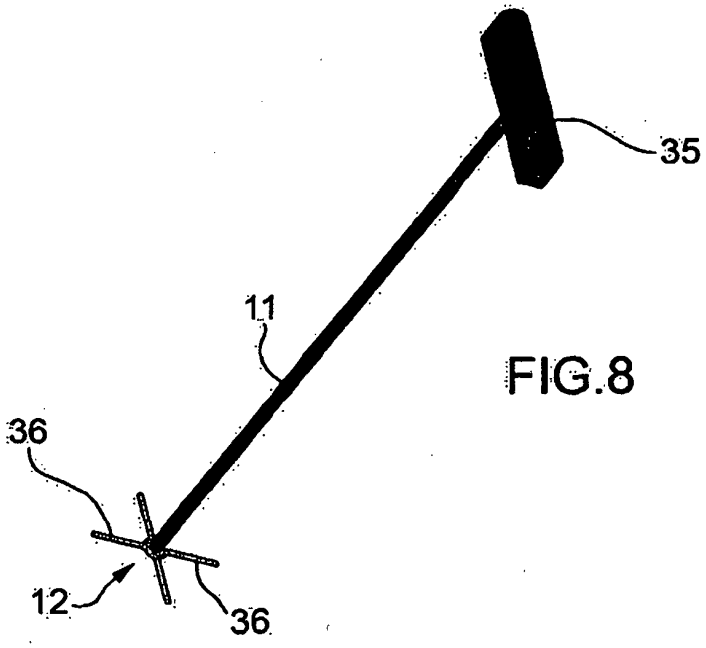

FIG.8

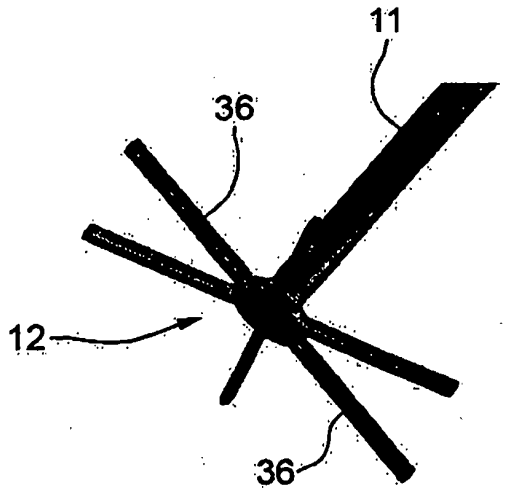

FIG.9

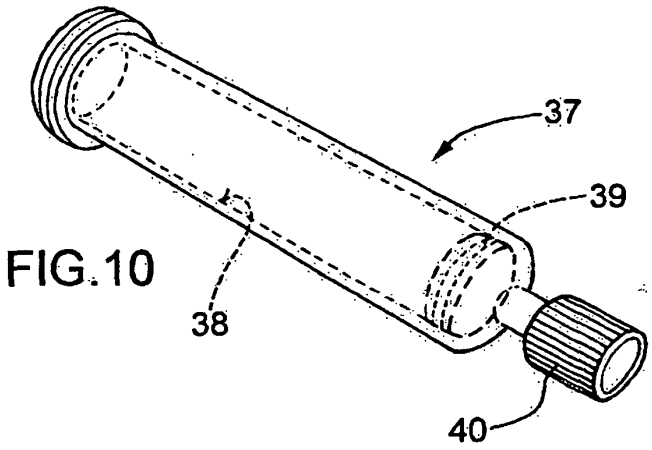

FIG.10

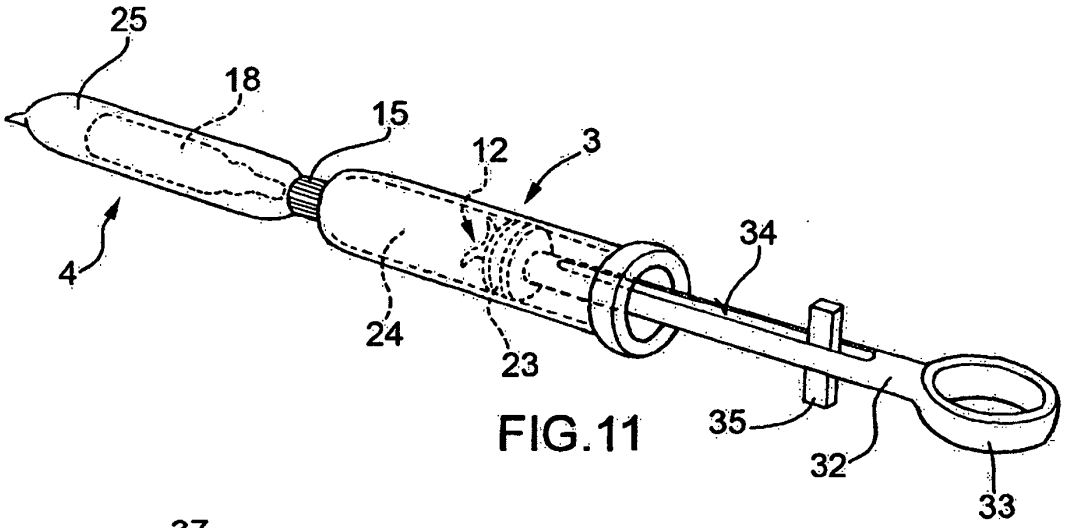

FIG.11

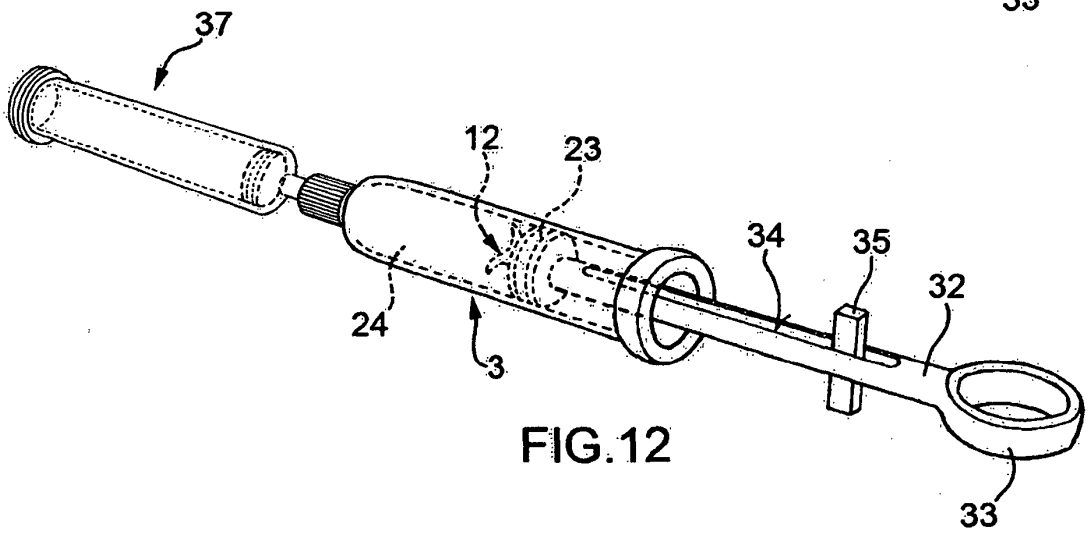

FIG.12

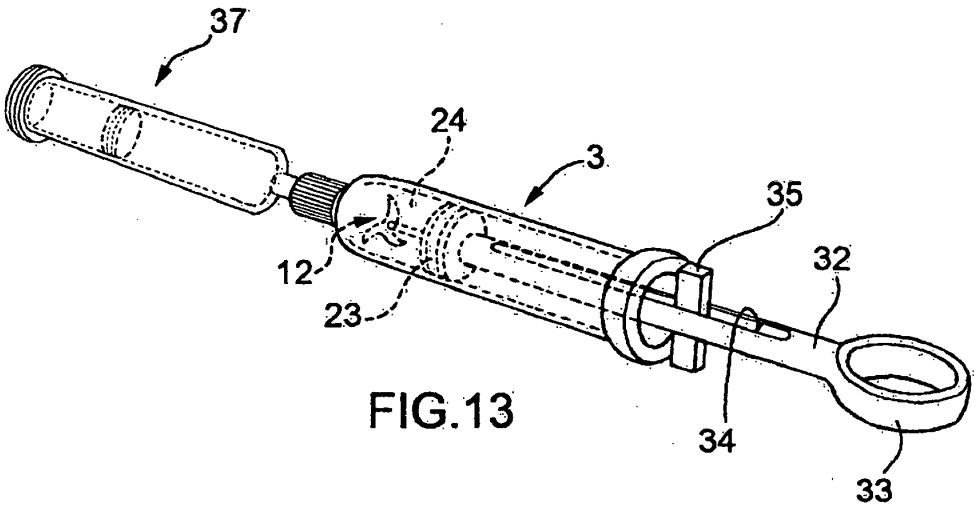

FIG.13

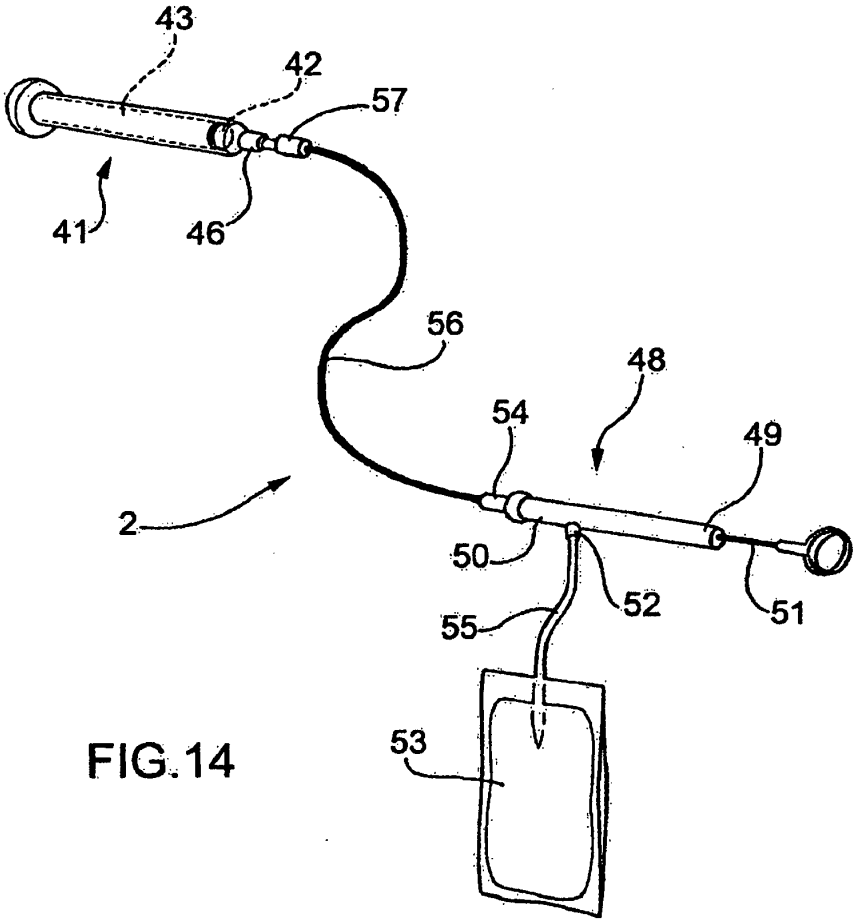

FIG.14

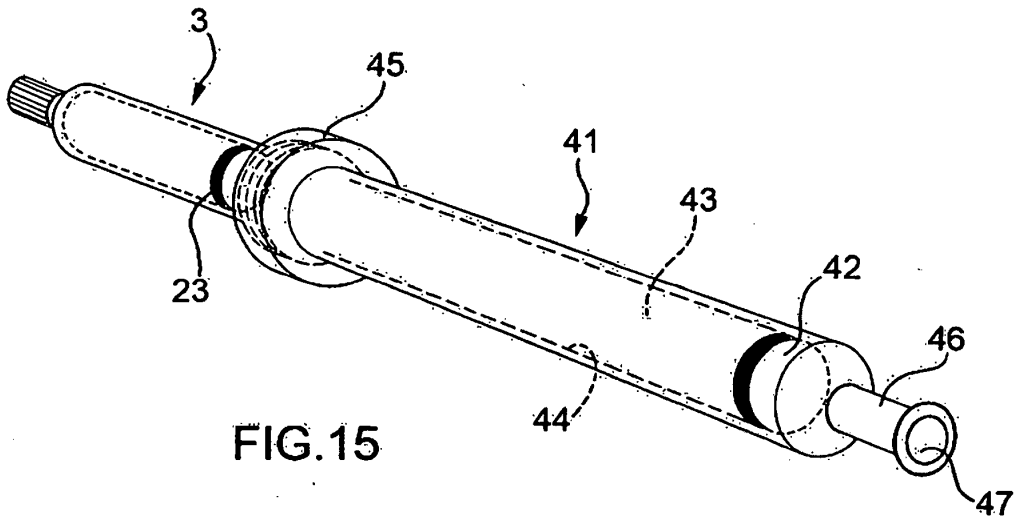

FIG.15

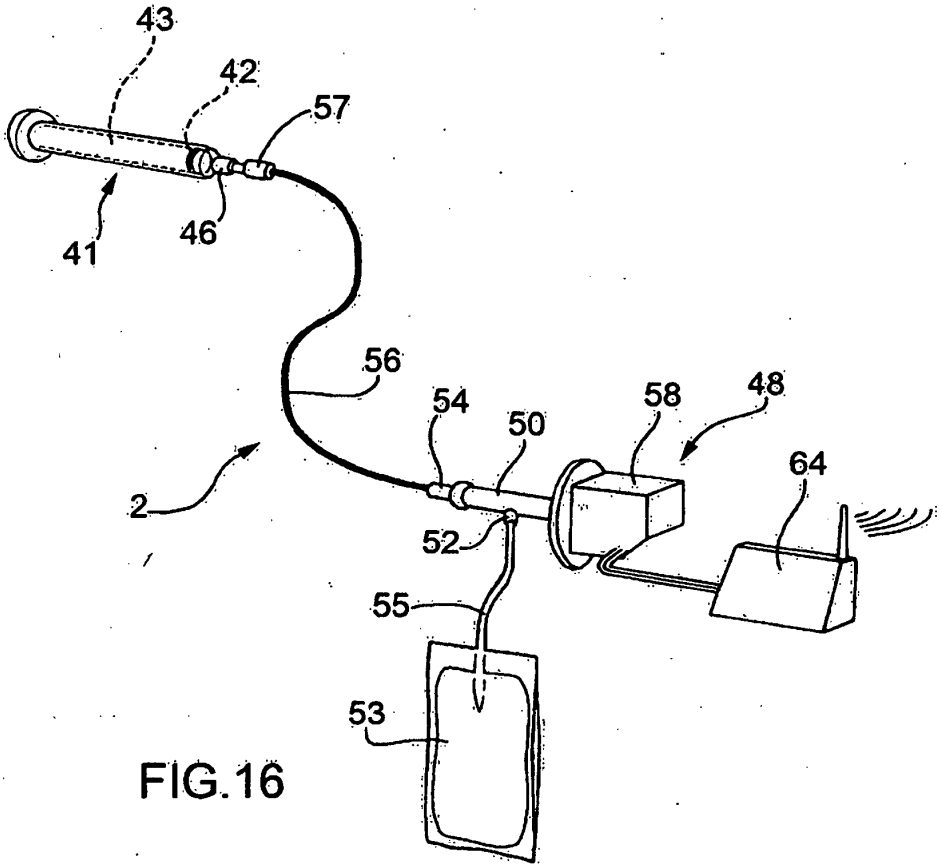

FIG.16

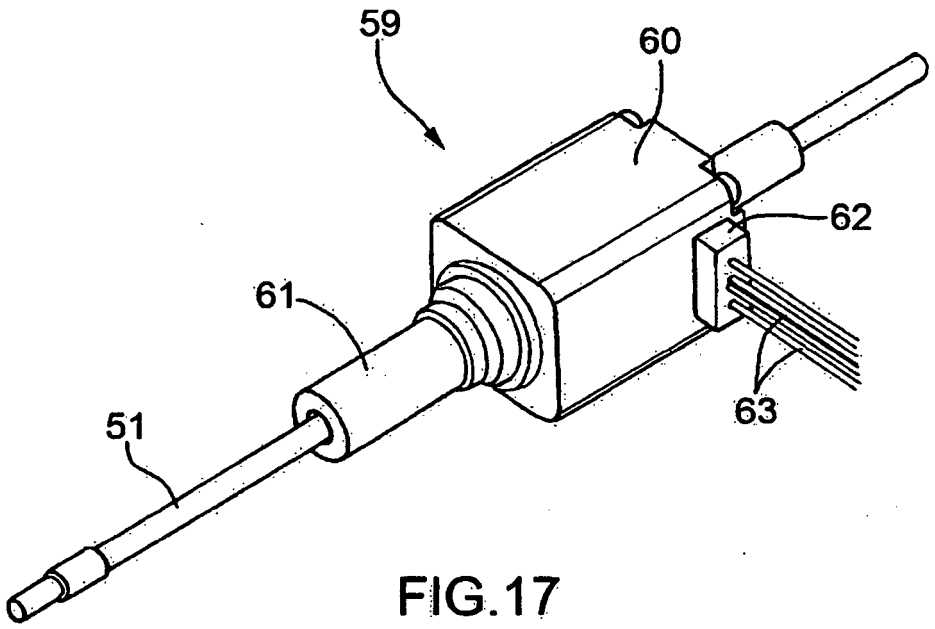

FIG.17

REFERENCES CITED IN THE DESCRIPTION

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- US 2005281132 A **[0012]**
- DE 19532015 **[0013]**